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ABSTRACT

Results of the 1985-86 National Assessment of Educational Progress (NAEP) survey of American students' knowledge of computers suggest that American schools have a long way to go before computers can be said to have made a significant impact. The survey covered the 3rd, 7th, and 11th grade levels and assessed competence in knowledge of computers, computer applications, and computer programming. Results indicated a widespread lack of familiarity with computer applications and programming as well as an emphasis on teaching programming rather than using computers in subject areas such as reading and English. Results also showed that roughly 30% of students had access to computers at home, but that socioeconomic factors played a disturbing role in limiting mminority students' access to computers. Despite the overall poor results, the rumored stall in the "computer revolution" disappears upon close examination. The NAEP results are 2 years old, based on generally unreliable self-report information, derived from a multiple choice test in a field which is primarily "hands on." The report's general conclusions are also heavily weighted by the computer programming section, but general computer literacy is unrelated to knowledge of computer programming. The computer revolution may be a growing surge rather than an explosion. (RS)

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RESEARCH ON COMPUTER - BASED EDUCATION FOR READING TEACHERS: A 1989 UPDATE:

RESULTS OF THE FIRST NATIONAL ASSESSMENT OF COMPUTER COMPETENCE

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Preconvention Institute: Computers and Reading, Lessons from the Past and the Technologies of the Future

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In A Nation At Risk, the National Commission on Excellence in Education suggested that schools add a fourth basic skill to the three R's: Competence in use of computers. The National Assessment of Educational Progress (NAEP) has just published its findings from the 1985-1986 survey of American students knowledge of computers.

One of the report's authors, Michael E. Martinez, presented a summary of the findings to International Reading Association members at the 1988 IRA Convention, in a preconvention institute sponsored by MicroSIG and directed by David Reinking and Shelley Wepner. Comprehensive results are available in Computer Competence: The First National Assessment by Martinez and Nancy A. Mead ($14.00, including shipping costs, available from NAEP, Rosedale Road, Princeton, NJ 08541, 800-223-0267). A discussion of the theoretical and practical underpinnings of the Assessment is also available (A Framework for Assessing Computer Competence: Defining Objectives, 1986).

The results suggest that American schools have a long way to go before we can say that computers have made a significant impact.

The Assessment of Computer Competence followed the same basic structure as other NAEP assessments. A national sample was obtained at three grade levels: Third, seventh, and eleventh. The test was multiple choice. Competence was assessed in three areas:

1. Knowledge of Computers--"the recognition or recall of specific ideas, facts, and procedures related to the use of computers" (p. 10). In one set of questions, for example, a picture of the components of a typical microcomputer workstation was displayed, and students were asked questions such as, 'Which picture shows a joystick?" (answered correctly by 89% of 3rd graders, 98% of 7th graders, and 99% of 11th graders) and "Which picture shows a printer?" (81%, 96%, and 98%, respectively). Other questions included, "What is the main role of a computer program?" (To tell the computer what to do, 32%, 34%, 46%) and "What is an algorithm?" (16%-7th grade, 31%-11th grade). Overall scores on items given to all three groups were: 3rd grade, 39%; 7th grade, 55%; 11th grade, 65%).

2. Computer applications--"students' skill in using applications software, such as word processing, graphics programs, database management systems, and spreadsheets" (p. 14). In one set of questions, for example, students were given a sample database including NAME OF STATE, STATE BIRD, STATE FLOWER, DATE STATE BECAME PART OF THE UNITED STATES. They were asked, 'Can the class use the database to list all states that have red flowers?" (answered correctly by 42% of 3rd graders), and "Can the class use the database to list all states that have the daisy as their state flower?" (58%). A page from a spreadsheet was displayed, and students were asked about necessary operations to solve simple problems. Overall scores on items given to all three groups (* indicates score from a version administered only to that particular grade level) were:

	Word Processing	Graphics	Databases	Spreadsheets
3rd	31%	38	40 *	Not tested
7th	55%	39	44 *	44 *
11th	72	40	53 *	31 *

3. Computer Programming. "Third and seventh graders were asked questions about Logo and BASIC, the languages with which they are most likely to be familiar. Eleventh graders were asked questions about BASIC and Pascal, the most common programming languages for high school students' (p. 21). Scores for questions administered to each specific grade were: 3rd grade Logo, 27%: 3rd grade BASIC 21%: 7th grade Logo, 26%: 7th grade BASIC, 26%: 11th grade BASIC, 27%: 11th grade Pascal, 30%.

Computer Use in Subject Areas

Despite the stir created by the appearance of microcomputers in classrooms, computers are little used in subject areas such as reading, science, and mathematics. The great majority of school computer use is directed toward teaching of programming. This was a surprising finding in the light of today's almost universal disdain for spending school time teaching children to program.

25 percent of third graders surveyed, and only 17 percent of eleventh graders, indicated that they had ever used a computer in reading or English class. 7 percent of seventh graders used a computer several times a week for reading instruction. Interestingly, computer-based mathematics instruction fared only a little better on this measure (10 percent) and science

instruction did worse (5 percent).

Some specific results:

"Have you ever used a computer in Reading-English?" Yes--Grade 3, 25%; Grade 7, 24%; Grade 11, 17%.

"How often do you use a computer to practice Reading?"

	Grade 7	Grade 11
Almost every day	3.1%	1.8%
Several times a week	3.8	2.1
About once a week	5.9	2.0
Less than once a week	8.8	6.9
Never	78.4	87.2

Home Use of Computers

Results underscored the potential for schools to use computers to build educational partnerships with homes. Roughly 30 percent of students have access to a computer at home. Families in the Northeast scored quite a bit higher on this measure. 41% of Northeastern children indicated that they have a computer at home. Results showed that those who did have computers at home scored higher in computer competence than those who did not. We educators sometimes forget how powerful learning outside school can be when students are sufficiently motivated. Interest in computers has reminded us of the crucial importance of encouraging informal learning activities in students "real" lives.

Access to Computers

Socioeconomic factors play a disturbing role in limiting minority student access to computers. More White than Black or Hispanic students have used a computer. More White students are studying with computers. More White students have computers at home. The differences between ethnic groups are especially evident at the lower grade levels assessed by NAEP, the third and seventh grades.

Computer Applications

Among knowledgeable computer-using teachers, there is an increasing awareness that drill and practice software is far less powerful an educational tool than the major "computer as a tool" applications: Word processing, database management, and spreadsheets. A major component of the NAEP tested student knowledge of these applications. To test knowledge of word processing, for example, a passage of text was shown and questions were posed, such as, "Pie is spelled wrong four times. What is the best way to fix this problem?" (Correct answer: Search and Replace).

Results showed widespread lack of familiarity with the applications, though knowledge level increased in the upper grades. Word processing proved the exception to these disappointing results. Yet simple knowledge of word processing did not mean that students benefited from that knowledge. More than 75 percent of the seventh and eleventh graders indicated

that they used a word processor less than once a week or not at all for writing. Only 3 percent of the seventh graders and 4 percent of eleventh graders used a word processor almost every day.

Critique

The study has great value in providing a baseline of information about computer use in the schools and student achievement. Several limiting factors must be held in mind, however.

1. The study was carried out in 1985-1986, and is only now being reported. The data are two years out-of-date in an educational area that experiences tremendous change.

2. Much of the data is self-report information from students rather than observational. This is notoriously unreliable.

3. Competence in computers is a "hands-on" issue. Assessing it through paper and pencil multiple choice testing is problematic.

4. General conclusions about student achievement cited in the report are often heavily weighted by the Computer Programming section. General computer literacy is unrelated to knowledge of programming.

Conclusions

The overall poor results might lead some toward pessimism about the future role computers will play in classrooms. Certainly we have sufficient evidence that the impact of computer technology has been minimal thus far, especially in instructional applications such as reading and writing.

Yet, the rumored stall in the "computer revolution" in the schools keeps disappearing whenever examined closely. A recent study, for example, reported that the number of computers in United States K-12 schools increased to 2 million in 1986-1987. This represented an increase of 25 percent over the previous school year. Among other findings (Talmis Group, as reported in Goodspeed, Jonathan. 1988. "Two Million Microcomputers Now Used in U.S. Schools." Electronic Learning, 7, no. 8 (May/June): 16.):

* Public schools planned to spend an average of $1400 each for software during 1987-1988.

* Public schools spent $170 million for software in 1986-7, and this was expected to increase to $200 million in 1987-8.

* Schools own an average of 55 software titles per building.

The "computer revolution" may be more of a growing surge than an explosion, but computers are ever more present in the schools just as they are in the home and on the job.